REMARKS/ARGUMENTS

Claims 1-36 and 49-59 remain in the application.

Claim 9 and 33 stand allowed.

Claims 1, 11, 14, 21, 28, 33, 35, 36, 53 and 54 are currently amended.

Claim 60 is newly presented.

Claim Rejections Under 35 USC § 102

Claims 1-3, 6, 10-25, 28, 34-36, 49-53 and 56-59 were rejected under 35 USC § 102(b) as being anticipated by US Patent 5,968,111 to Bae, et al.

The present invention recited in claim 1 is a method for filtering data, wherein a plurality of data samples is received; a locus of the samples is computed; a value of an input sample is normalized to a range centered on the locus; and only then are the data passed through a distance-based filter.

In contrast, Bae et al. teaches an eight-degree circular median filter having a data sorter 20 that fails to initially normalize a value of an input sample to a range that is centered on the locus of the data samples received by the filter, and only then pass the data through a distance-based filter, as recited in amended claim 1.

Rather, Bae teaches an eight-degree circular median filter having a data sorter 20 that sorts input data into median cells 21-29 in a magnitude sequence. The median cells 21-29 supply the sorted data to a distance calculator 31 and a multiplexer 33 in a median determiner 30. When external (new) data is input to the data sorter 20, the median cells 21-29 delete the oldest input data among the nine prestored data, and resorts the newly input data and eight prestored data, excluding the oldest input data. The newest nine data are stored in the median cells 21-29 in magnitude sequence. The newly sorted data stored in the median cells 21-29 are supplied to the median determiner 30. Column 2, lines 40-59.

The distance calculator 31 and multiplexer 33 of the median determiner 30 both receive the nine magnitude sequenced data as supplied from the median cells 21-29. The distance calculator 31 calculates a distance between the two neighboring data with respect to the nine data supplied from the median cells 21-29 in the data sorter 20. The distance calculator 31 outputs the distance data to a comparitor 32, which compares the distance data and supplies a comparison result signal CTL to the multiplexer 33. Column 2, line 60-column 3, line 2.

The distances calculated by the distance calculator 31 are input to the comparator 32. The comparator 32 compares the distances supplied from the distance calculator 31, determines a maximum distance, and generates a select control signal CTL for selecting a pair of median cells corresponding to the determined maximum distance. The generated select control signal CTL is input to the multiplexer MUX 33. Column 3, lines 28-40.

The multiplexer 33 selects one of the data supplied from the median cells 21-29 in the data sorter 20 on the basis of the select control signal CTL received from the comparator 32, and outputs the selected data as median data MOUT. The median value of the data belonging to the definition domain shown in FIG. 2B is data which is the farthest from a pair of data in which a distance between data is the farthest when data is represented according to the magnitude on a circle C. Thus, the multiplexer 33 uses a relationship shown in the Table, in order to select one of data supplied from the median cells 21-29 based on the select control signal CTL. Column 3, lines 41-52.

Table shows pairs having possible maximum distances and median values corresponding to each pair having a maximum distance, with respect to the nine data R[0]-R[8] being sorted in a magnitude order. Column 3, lines 52-58.

Thus, in contrast to the present invention, Bae does not teach normalizing the data to a range that is centered on the locus of the data samples before passing the data through a distance-based filter, as recited in claim 1. Rather, according to Bae, the data are only sorted and arranged in a magnitude order in the median cells 21-29 before it is fed to the median determiner 30. Column 2, lines 40-59. The median determiner 30 includes both the distance calculator 31 that outputs the distance data to the comparitor 32 for generating the comparison result signal CTL, and the multiplexer 33. Column 2, line 60-column 3, line 2. The multiplexer 33 "outputs the selected data as median data MOUT." Column 3, lines 41-44.

According to Bae, the multiplexer 33 outputs the median data MOUT as a function of the select control signal CTL received from the comparator 32, which is only a maximum distance between neighboring data. Column 3, lines 28-40. Thus, in contrast to the present invention, Bae does not teach the median data being based upon data samples that are "normalized" to a range that is centered on the locus of the data samples, as claimed for the present invention.

For at least the above reasons, claim 1 is allowable.

The Applicant previously presented arguments that, although Bae et al. deals with circular data, in contrast to the present invention, Bae et al. fails to provide any teaching for limiting the normalized output value of the distance-based filter within selected limits of normalization, as recited in claim 1. However, the limitations as to limiting the normalized output value of the distance-based filter within selected limits of normalization that the Applicant previously added to claim 1 are currently deleted as being overly restrictive in light of the broader claim scope that the Applicant believes is warranted given the above limitations on the teachings of the prior art.

Claim 1 is returned by the instant amendment to substantially its original text as originally filed. The current addition of the term "initially" in line four, and of the phrase "after normalizing the value of the input sample," in line five are intended to merely more particularly point out and distinctly claim the subject matter which the Applicant regards as his invention. The amended claim language is believed not to be necessary for patentability of the invention, nor necessary for allowability of the claim.

Claims 2, 3, 6, 10 and 49 are allowable at least as depending from allowable claim 1.

Claims 11, 14, 21 and 28 differ in scope from allowable claim 1. However, the above arguments directed to claim 1 are sufficiently applicable to claims 11, 14, 21 and 28 as to make repetition unnecessary. Thus, for each of the reasons above, claims 11, 14, 21 and 28 are believed to be allowable as currently amended.

Claims depending from base claims 11, 14, 21 and 28 are allowable at least as depending from an allowable base claim.

Claim Rejections Under 35 USC § 103

Claims 4, 5, 7, 8, 26, 27 and 29-32 were rejected under 35 USC § 103(a) over US Patent 5,968,111 to Bae, et al. in view of US Patent 6,018,750 to Connell, et al.

As discussed above, Bae et al. does not disclose or suggest initially normalizing a value of an input sample to a range centered on the locus, and limiting the distance-based filter to passing the data through a distance-based filter only after normalizing the value of the input sample, as recited in amended claim 1.

Connell, et al. fails to provide the deficiencies of Bae, et al. Connell, et al. teaches a median filter in a misfire detection system (column 3, lines 28-30) that also fails to disclose or

suggest limiting the distance-based filter to passing the data through a distance-based filter only after normalizing the value of the input sample, as recited in amended claim 1.

For at least the above reasons, the invention recited in amended claim 1 is believed to be allowable over both Bae, et al. and Connell, et al.

Claims 4, 5, 7 and 8 are allowable at least as depending from allowable claim 1.

Claims 21 and 28 differ in scope from allowable claim 1. However, the above arguments directed to claim 1 are sufficiently applicable to claims 21 and 28 as to make repetition unnecessary.

Claims 26 and 27 are allowable at least as depending from allowable base claim 21.

Claims 29-32 are allowable at least as depending from allowable base claim 28.

Allowable Subject Matter

The Examiner is thanked for indicating that claims 9 and 33 are allowed.

Claim 33 is amended to correct a minor informality discovered during a current review of the claim. Amended claim 33 contains no new subject matter.

The Examiner is thanked for indicating that claims 54 and 55 contain allowable subject matter and would be allowable if rewritten in independent form. Although the Applicant believes that the base claim 1 from which claims 54 and 55 depend to be allowable, the Applicant has herein rewritten claim 54 in independent form, including the limitations of base claim 1, there being no intervening claims. Claim 54 is therefore now believed to be allowable.

Claim 55 is allowable as originally recited at least as depending from allowable claim 54.

Newly Presented Claims

Claim 60 is newly presented. Newly presented claim 60 does not contain new subject matter. The subject matter of claim 60 is found in the specification as published in paragraph [0040], which is reproduced here:

> [0040] One embodiment of the present invention includes two approximations or adjustments that trade mathematical precision for real-world run-time efficiency. The approximate computation of the locus of the samples in Block 110 as implemented in FIG. 7 may yield implementation-dependent results for unusual input sequences. Also, the output range is controlled by filter implementation rather than by the input source, which may produce unexpected results if the filter

in Block 150 is part of an algorithm library and is not well documented. The behavior can be used to advantage, however, by downstream processing. For example, if one signal is heading (0 . . . 360 degrees) and another signal is track (.+-.180 degrees), then a processing application downstream from the circular distance filter of the present invention typically has first to normalize the heading and track to the same domain of values before a compare or subtract can be performed, for example, to compute yaw or wind or other information. The circular distance filter of the invention normalizes its data to a chosen range, which eliminates an additional downstream set of compare/add operations for each input. (Emphasis added.)

Newly presented claim 60 is allowable as depending from allowable claim 1.

Furthermore, newly presented claim 60 is allowable independently of allowable base 1 as reciting normalizing a value of an input sample to a range centered on the locus further comprising selectively adapting the range as a function a range of the data samples, which is not found in the prior art.

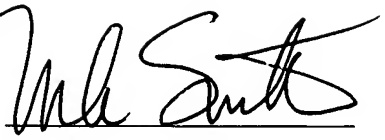
One advantage of the selectively adapting the normalizing range as a function a range of the data samples, as recited in claim 60, is that some equipment output their data in a of range 0 to 360 degrees, e.g., heading, while other equipment output their data in a of range -180 to +180 degrees, e.g., longitude. The filter of the present invention automatically adapts to whichever range is currently in use, which minimizes the average number of normalization operations required over time.

For at least the above reasons, newly presented claim 60 is allowable independently of allowable base 1.

The claims now being in form for allowance, reconsideration and allowance is respectfully requested.

If the Examiner has questions or wishes to discuss any aspect of the case, the Examiner is encouraged to contact the undersigned at the telephone number given below.

Respectfully submitted,

Attorney: 

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